PATENT SPECIFICATION

Application Date: April 29, 1937. No. 12219/37. **493,635**

Complete Specification Left: Dec. 16, 1937.

Complete Specification Accepted: Oct. 12, 1938.

PROVISIONAL SPECIFICATION

Improvements in and relating to Metal Structures

We, LEWIS CONSTRUCTION COMPANY LIMITED, a British Company, of Steleonite Works, Hayes, Middlesex, and MAX HEYMAN, a British Subject, of the same address, do hereby declare the nature of this invention to be as follows:—

This invention relates to metal structures of all kinds, such as are used for building purposes either separately or in combination with various other materials, for example wood, brick, concrete and the like.

The present invention relates more particularly, but not exclusively to structural members adapted to support the main loads of structures, such as girders and beams.

When rolled steel joists are used either separately or assembled in the form of a girder structure the absolute minimum thickness of steel which can be employed is a quarter of an inch so that the weight of these members is always considerable.

The primary object of the present invention is to provide structural members from steel which are light in weight and are capable of supporting substantially the same load as joists or girders constructed from rolled steel, whilst being formed of steel of a thickness which is capable of being rolled and bent cold. In this manner there is effected a considerable economy in weight and material as compared with existing structural members.

According to the present invention a girder structure is composed of a pair of flanges connected together by struts, the flanges and struts being constructed of channel section steel of a thickness enabling it to be rolled and bent in the cold, that is to say a thickness below a quarter of an inch. The struts, and if desired also the flanges, may be provided transversely with one or more channels of which the bottoms are in the same plane, or substantially in the same plane as the edges of the sides of the channel-shaped members. These channels may have sloping sides, the slope being preferably outwardly from the surface of the member to the bottom of the channel. If desired the flanges may be reinforced by a T-iron secured to the outer surface of the assembled girder or by means of two angle irons arranged back to back. In assembling a girder the flanges are preferably arranged with their open sides directed in the same direction, preferably downwardly when in the position of use.

In carrying the invention into effect according to one example of construction the two longitudinal members of a girder are formed of channel section of 16 gauge steel the width being approximately six times the depth of the flanges. A suitable size is preferably a width of 8″ and a depth of flange of 1½″. These two flanges are arranged a suitable distance apart with their open faces both turned in the same direction and are braced together by inclined stays of the same construction. If desired vertical stays of the same construction may be arranged at intervals between the flanges of the girder. These vertical stays are preferably located at points where the inclined stays are connected to the flange members.

If desired the stays, and preferably also the flange members may be corrugated and for this purpose are provided with one or more channels extending longitudinally thereof. the base of the channel or channels being substantially on a level with the edge of the flange on the stay or flange member. The side walls of the channels are preferably inclined outwardly from the surface of the stay or girder to the bottom of the channel.

The stays are preferably narrower than the flange members so that when assembling a girder the stays fit between the channels of the flange members, or at least between the flanges of the upper flange member into which the ends of the stays are fitted or secured, the other ends of the stays being secured to the surface of the lower flange member.

For the purpose of securing the stays to the flange members the ends of the stays are flattened and are secured to the flange members by any suitable means such as bolting, rivetting or welding, with or without clamping, packing or like intermediate members.

[*Price* 1/-]

Price 4s 6d

Various advantages are obtained by the construction of a girder from elements formed in accordance with the invention of which the principal ones are the saving in weight and ease of construction. A girder constructed in accordance with the invention is about a quarter to a third the weight of a built-up girder constructed in the usual way from ordinary material for equal strength. The particular gauge of which the elements are made, which is below a quarter of an inch in thickness enables the elements to be rolled and bent in the cold from steel. It has been found that the most suitable material for producing the elements of a girder in accordance with the invention is steel from 10 gauge in thickness, down to 16 gauge steel plate.

Whilst it is preferred to have the open sides of the flange members turned downwardly it will be understood that the open sides may be turned towards one another, that is to say inwardly, in which case the lower ends of the stays are secured inside the open face of the lower flange member.

For the purpose of strengthening the flange members there may be secured thereto, centrally and longitudinally, a reinforcing member of T-iron or two reinforcing members of angle iron, arranged side by side, and suitably secured together, and secured to the flange members in any suitable manner as by bolting, rivetting, welding and so forth.

Dated this 29th day of April, 1937.
W. FAIRBURN-HART & CO.,
12, South Parade, Leeds, 1, and
75, Chancery Lane, London, W.C.2.

COMPLETE SPECIFICATION

Improvements in and relating to Metal Structures

We, LEWIS CONSTRUCTION COMPANY LIMITED, a British Company, of Steleonite Works, Hayes, in the County of Middlesex, and MAX HEYMAN, a British Subject of the same address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to metal structures of all kinds, such as are used for building purposes either separately or in combination with various other materials, for example wood, brick, concrete and the like.

The present invention relates more particularly, but not exclusively to structural members adapted to support the main loads of structures, such as girders and beams.

When rolled steel joists are used either separately or assembled in the form of a girder structure the absolute minimum thickness of steel which can be employed is a quarter of an inch so that the weight of these members is always considerable.

The primary object of the present invention is to provide structural members from steel which are light in weight and are capable of supporting substantially the same load as joists or girders constructed from rolled steel, whilst being formed of steel of a thickness which is capable of being rolled and bent cold. In this manner there is effected a considerable economy in weight and material as compared with existing structural members.

It is already well known to construct girders composed of a pair of flanges or flange members connected together by struts all formed of channel section steel of extremely thin gauge.

According to the present invention a girder structure is composed of a pair of flanges connected together by struts, the flanges and struts being constructed of channel section steel of a thickness below a quarter of an inch, the flange members being reinforced by a T-iron, or by a pair of angle irons arranged side by side. The struts, and if desired also the flanges may be provided transversely with one or more channels of which the bottoms are in the same plane, or substantially in the same plane as the edges of the sides of the channel-shaped members. These channels may have sloping sides, the slope being preferably outwardly from the surface of the member of the bottom of the channel. In assembling a girder the flanges are preferably arranged with their open sides directed in the same direction preferably downwardly when in the position of use.

The invention will now be described with reference to the accompanying drawings wherein:—

Fig. 1 shows a partial elevation of a girder.

Fig. 2 is a cross-section on the line 2—2 of Fig. 1.

Fig. 3 is a cross-section on the line 3—3 of Fig. 1 to a larger scale.

Fig. 4 is a cross-section on the line 4—4 of Fig. 1 to a larger scale.

Fig. 5 is a partial perspective view to a larger scale of one of the stays shown in Fig. 1.

Fig. 6 is a similar view to Fig. 5 show-

ing the ends cut away before flattening, and

Fig. 7 shows the member in Fig. 6 flattened at the end.

Referring first to Figs. 1 to 3, the two longitudinal members 10, 11 of a girder are formed of channel section of 16 gauge steel the width being approximately six times the depth of the flanges. A suitable size is preferably a width of 8" and a depth of flange of 1½". These two members 10, 11 are arranged a suitable distance apart with their open faces both turned in the same direction and are braced together by inclined stays 12 of the same construction. If desired vertical stays 13 of the same construction may be arranged at intervals between the members 10, 11 of the girder. These vertical stays 13 are preferably located at points where the inclined stays 12 are connected to the flange members 10, 11.

If desired the stays 12, 13, and preferably also the flange members 10, 11, may be corrugated and for this purpose are provided with one or more channels 14, 15 (Figs. 4 and 1) extending longitudinally thereof, the base of the channel or channels 14, 15 being substantially on a level with the edge of the flange 16 on the stay 12, 13 or flange member. The side walls of the channels are preferably inclined outwardly as shown at 17 from the surface 18 of the stay or girder to the bottom of the channel 15.

The stays 12, 13 are preferably narrower than the flange members 10, 11 so that when assembling a girder the stays 12, 13 fit between the channels of the flange members 10, 11, or at least between the flanges of the upper flange member 10 into which the ends of the stays 12, 13 are fitted or secured, the other ends of the stays 12, 13 being secured to the surface of the lower flange member 11.

For the purpose of securing the stays 12, 13 to the flange members 10, 11 the ends of the stays 12, 13 are flattened as shown at 19, and are secured to the flange members 10, 11 by any suitable means such as bolting 20, rivetting or welding, with or without clamping, packing or like intermediate members.

Various advantages are obtained by the construction of a girder from elements formed in accordance with the invention of which the principal ones are the saving in weight and ease of construction. A girder constructed in accordance with the invention is about a quarter to a third the weight of a built-up girder constructed in the usual way from ordinary material for equal strength. The particular gauge of which the elements are made, which is below a quarter of an inch in thickness enables the elements to be rolled and bent in the cold from steel. It has been found that the most suitable material for producing the elements of a girder in accordance with the invention is steel from 10 gauge in thickness down to 16 gauge steel plate.

Whilst it is preferred to have the open sides of the flange members 10, 11 turned downwardly it will be understood that the open sides may be turned towards one another, that is to say inwardly, in which case the lower ends of the stays 12, 13 are secured inside the open face of the lower flange member 11.

For the purpose of strengthening the flange members there are secured thereto, centrally and longitudinally, a reinforcing member of T-iron or two reinforcing members of angle iron 21, 22, arranged side by side, and suitably secured together, and secured to the flange members 10, 11 in any suitable manner as by bolting 23, rivetting, welding and so forth.

Referring now to Figs. 6 and 7 it will be seen that the ends of the flanges 16 are cut away whereupon the end is flattened and suitably bent as indicated at 19^1 for facilitating securing in position.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A girder construction composed of a pair of flanges or flange members connected together by struts, the flanges and struts being constructed of channel section steel of a thickness below a quarter of an inch, wherein the flange members are reinforced by a T-iron, or by a pair of angle irons arranged side by side.

2. A girder structure according to Claim 1, wherein the struts are provided transversely with one or more channels of which the bottoms are in the same plane or substantially in the same plane as the edges of the sides of the channel-shaped struts.

3. A girder structure according to Claim 1, wherein the flange members are provided transversely with one or more channels of which the bottoms are in the same plane, or substantially in the same plane as the edges of the sides of the flange members.

4. A girder structure according to Claims 2 or 3, wherein the channels have sloping sides, the slopes being preferably downwardly from the surface of the member to the bottom of the channel.

5. A girder structure according to any of the preceding claims wherein the flange members are arranged with their open

sides directed in the same direction, preferably downwardly when in the position of use.

6. A girder structure according to any one of Claims 1—4, wherein the open sides of the flange members are turned towards one another.

7. A girder structure according to any of the preceding claims, wherein the ends of the side members of the stays are cut away and the ends of the stays are flattened.

8. A girder structure, substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 16th day of December, 1937.

W. FAIRBURN-HART & CO.,
12, South Parade, Leeds, 1, and
75, Chancery Lane, London, W.C.2.

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493,635 COMPLETE SPECIFICATION

[This Drawing is a reproduction of the Original on a reduced scale.]

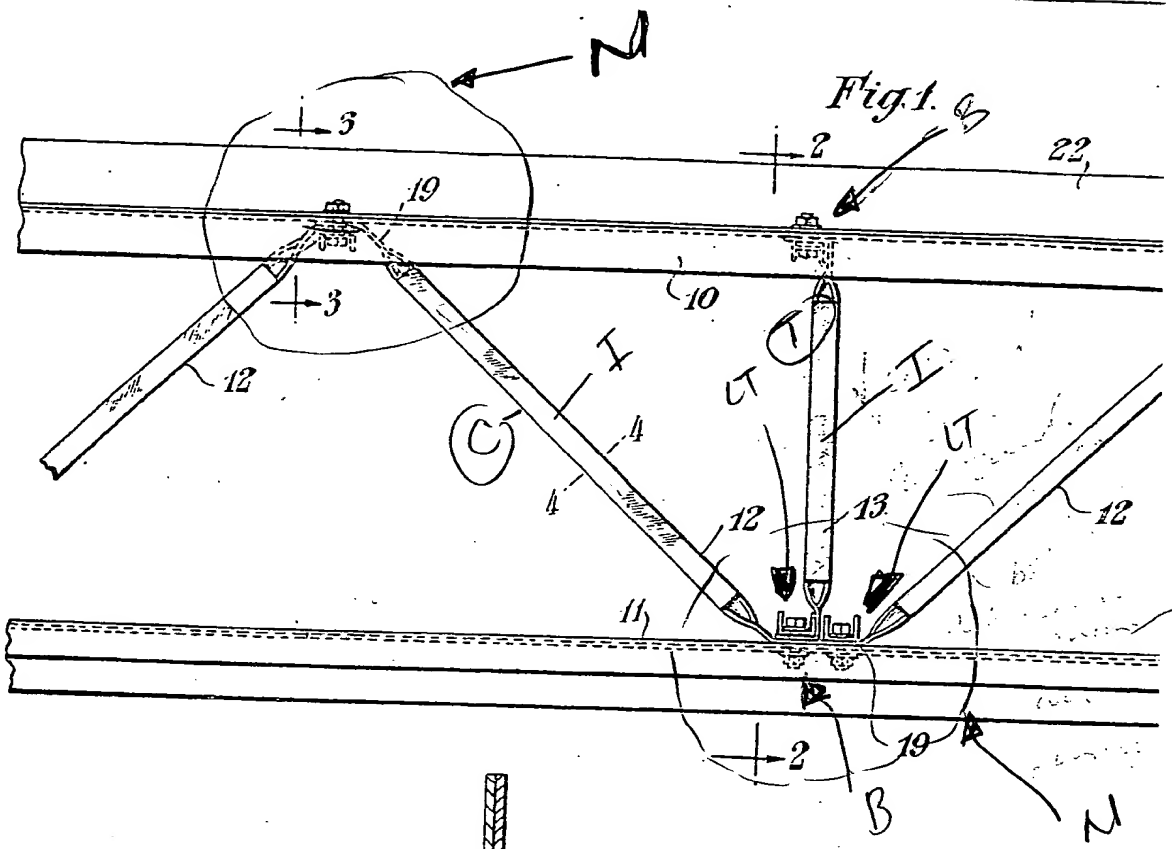


Fig. 1.

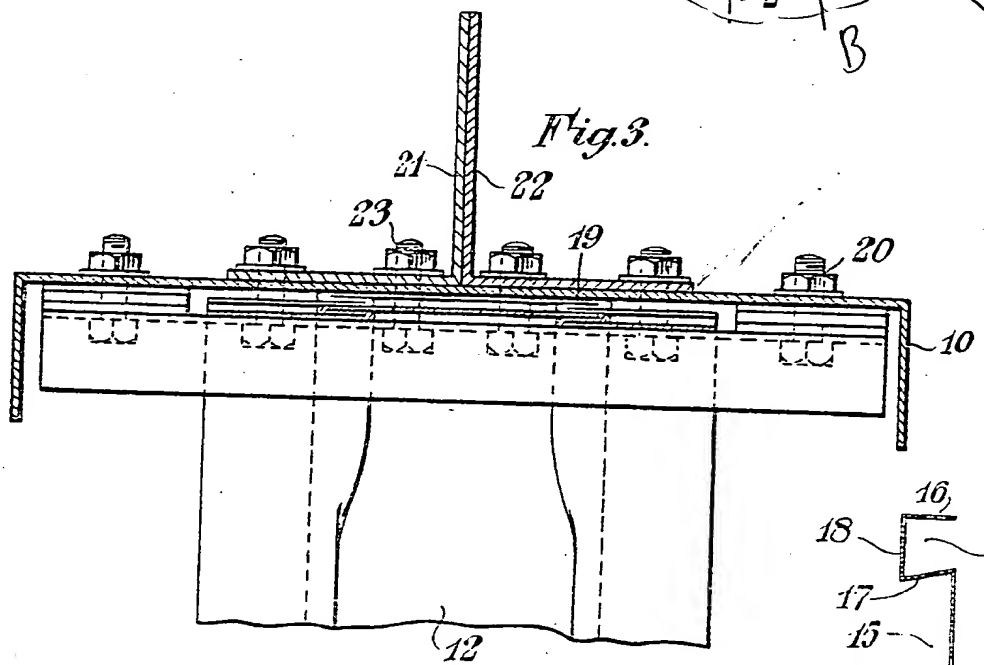


Fig. 3.

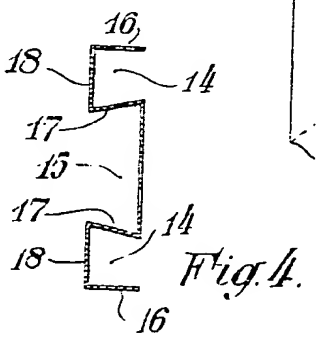


Fig. 4.

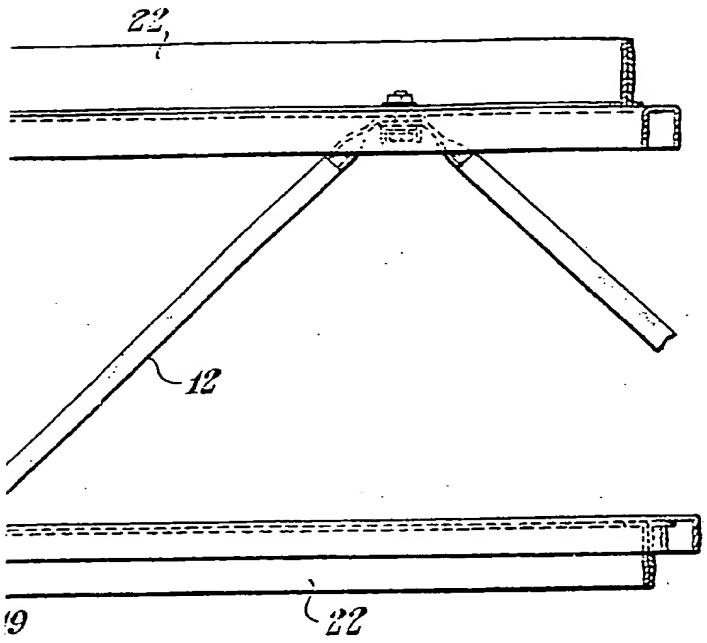
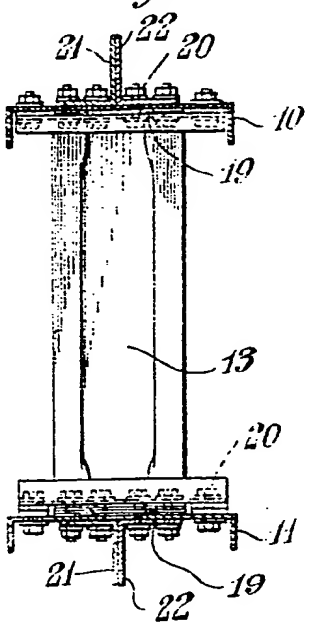


Fig.2.



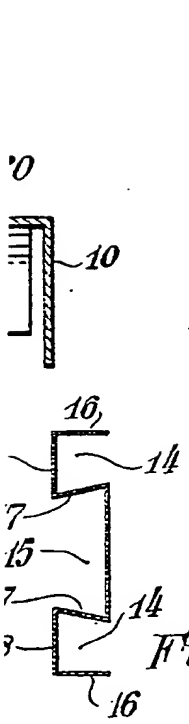


Fig.4.

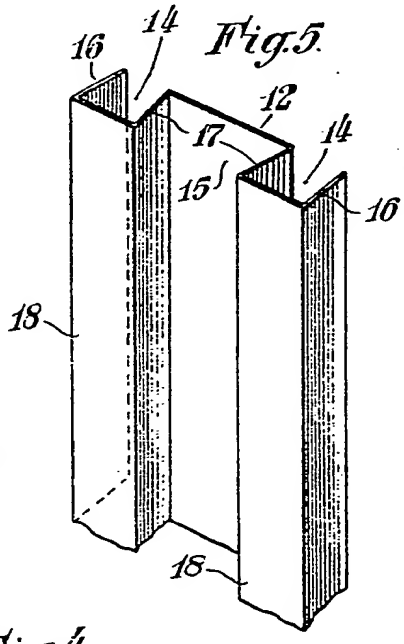


Fig.5.

Fig.6.

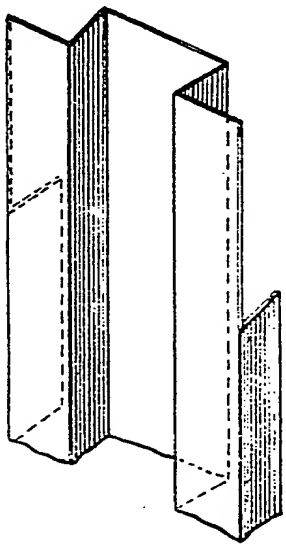


Fig.7.

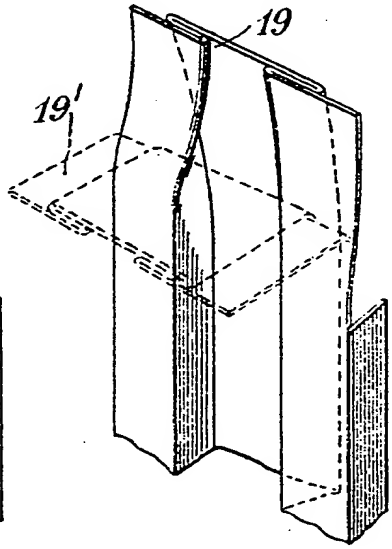


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Fig. 1.

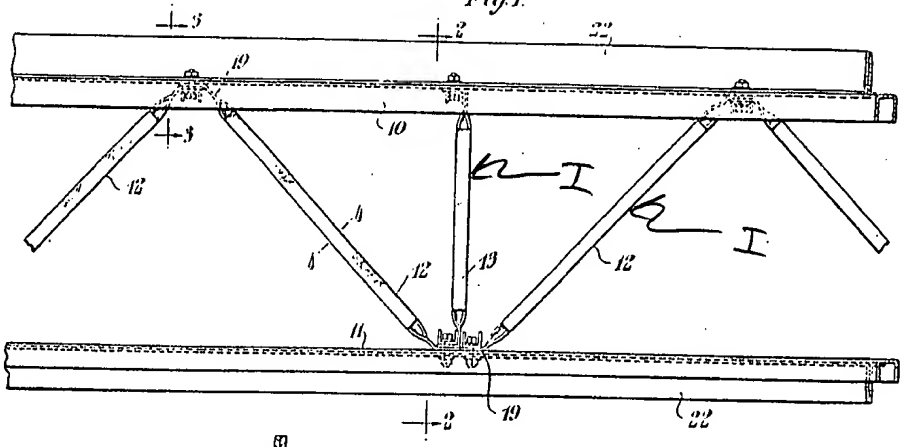


Fig. 2.

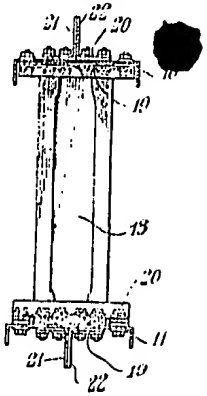
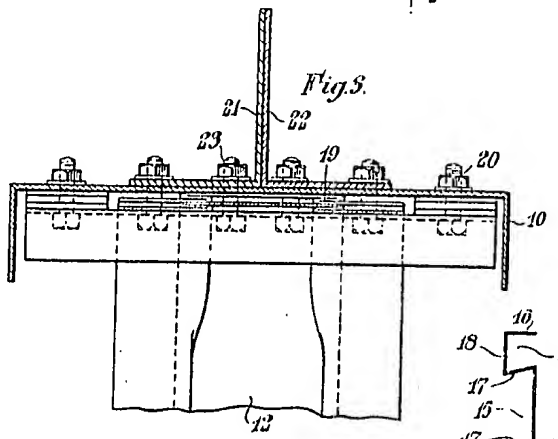


Fig. 3.



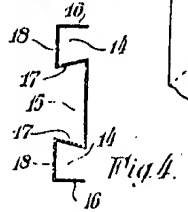


Fig. 4.

Fig. 5.

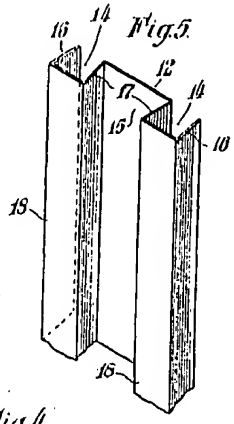


Fig. 6.

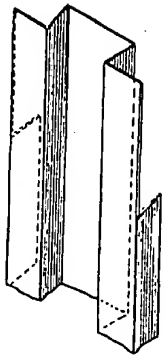
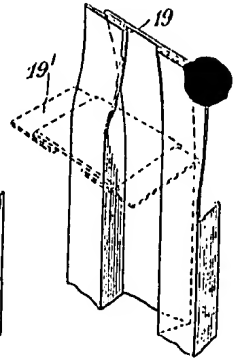


Fig. 7.



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